PACIFIC POWER
A DIVISION OF PACIFICORP

825 NE Multnomah, Suite 2000
Portland, Oregon 97232

March 31, 2017

VIA ELECTRONIC FILING

Public Utility Commission of Oregon
201 High Street SE, Suite 100
Salem, OR 97301-3398

Attn: Filing Center

RE: Advice 16-04–Compliance Filing– 2016 Report on Pacific Power's Irrigation Load Control Pilot Program

PacifiCorp d/b/a Pacific Power (Pacific Power or Company) submits the attached 2016 Irrigation Load Control Pilot Program Report. The report is provided in compliance with the terms of the Company's Irrigation Load Control Pilot Program that was approved by the Public Utility Commission of Oregon on May 3, 2016.

The enclosed report of the activity and results for 2016 reflects a partial year of availability for dispatch events, as initial customer enrollment, equipment installation, and testing was still underway through much of the June 1 – August 15 program period. The report includes the information and analyses that could be completed with the limited information and program experience that occurred in 2016.

Pacific Power requests that all formal information requests regarding this matter be addressed to:

By E-mail (preferred): datarequest@pacificorp.com.

By regular mail: Data Request Response Center
PacifiCorp
825 NE Multnomah, Suite 2000
Portland, OR 97232

Informal inquiries may be directed to Natasha Siores at (503) 813-6583.

Sincerely,

R. Bryce Dalley
Vice President, Regulation

Enclosure

2016 Irrigation Load Control Pilot Program in Oregon

May 4, 2016 – December 31, 2016

Issued March 31, 2017

PACIFIC POWER
A DIVISION OF PACIFICORP

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Overview

PacifiCorp has operated an irrigation load control program in Idaho since 2003 and in Utah since 2007. These voluntary direct load reduction programs allow the PacifiCorp to better manage summer peak loads by providing incentives to customers that allow the Company to interrupt their irrigation service under certain conditions.

On May 3, 2016, the Public Utility Commission of Oregon (OPUC) approved PacifiCorp d/b/a Pacific Power's (Company) request to implement a pilot irrigation load control program for customers within the Oregon portion of the Klamath Basin. The Irrigation Load Control Pilot Program (pilot program) was filed to test the design characteristics of the Company's existing irrigation load control program for its Oregon customers.

This report summarizes 2016 Pilot Program activity and presents the key findings from the first year. In its pilot program application, the Company identified the following key elements that would be provided annually. The following table describes where each of these elements are addressed in this report.

Element	Start Page	Section
1. Review of annual enrollment		
a. Total program enrollment	12	Enrolled Customers
b. Sites added and removed	12	Enrolled Customers
c. Customer outreach	11	Customer Outreach
d. Crop(s)	13	Customer Crop/Operations and Pumping Equipment
e. Weather data from local weather station(s)	14	Weather and Drought Impact
f. Available information on water restrictions	13	Impact of Irrigation Technology and Water Availability
2. Customer satisfaction a. Customer requests for retirement b. Site reassignment management	4	Participant Behavior *There were no customer requests for retirement or reassignments in 2016
3. Incentive payments	12 20	Customer Payment Structure Appendix B: Customer Payments
4. Review of annual program performance		
a. Weekly available load reduction	15	Weekly Available Load Reduction
b. Load control events	16	Load Control Events
c. Availability and load reduction comparison	7	Availability
5. Key observations	4	Key Findings

In 2016, the pilot program focused on enrolling a small number of initial participants, establishing load control event equipment hook-ups, testing, and related logistics. One two-hour event was called in August 2016. The event was required as final testing for initial participants and triggered by a forecast of higher power prices to ensure participants experienced operational

impacts in real time (i.e., the same season as enrollment and incentive payments). Key findings from 2016 focus on participant behavior, event logistics and initial delivery costs.

Key Findings

Participant Behavior

Initial limited roll-out suggests that grower interest is not a barrier to irrigation load control in the Oregon portion of the Klamath Basin. The pilot was able to recruit a small number of initial participants in a short period of time. During the single dispatch event, participants fulfilled their commitment to curtail irrigation usage. In addition, participants did not indicate concerns about water availability for the current season.

Logistics

The single event called in 2016 indicates that the resource (kW available for load control events) can be ramped up quickly with an experienced delivery provider and an engaged grower community. Elapsed time from initial customer outreach to the first event was approximately 12 weeks.

Event notification was successful and customers participated when called (i.e., did not opt out). Event information including baseline, load curtailed and post event load was successfully captured by program devices and the network operations center. Data on connected load for these sites during the remainder of the irrigation season was also transmitted from the devices and archived at the network operations center.

Delivery Costs

The Company and their delivery provider were able to enter the market in 2016 and gain insight into options for subsequent years; however the small scale program pricing and contract structure for future years of the pilot will be reassessed, as further described below.

Assessing Costs and Benefits

The pilot program is intended to test designs, provide market feedback, and generate information about delivery. While the Company will monitor the pilot costs and potential benefits to understand the feasibility of expansion in Oregon beyond this initial pilot phase, the first year results provide only limited information in this regard. Appendix 2 provides a discussion of potential benefits and initial findings related to the pilot objectives, including a discussion of potential benefits utilizing demand response protocols from California.

Background

On March 19, 2015, the Company held a workshop for irrigation customers in the Klamath Basin to provide an update on energy efficiency programs and a time-of-use pilot that was underway.[1] At the workshop, the Company outlined a potential irrigation load control pilot based on the Company's Utah and Idaho program design. Growers indicated support for the load control pilot

[1] Oregon Schedule 215 – Irrigation Time-of-Use Pilot Supply Service.

program and emphasized their interest in a multiple-year offer and the ability to opt out of individual events.

The Company's 2015 Integrated Resource Plan (IRP), filed March 31, 2015, committed to pursue a west-side irrigation load control pilot beginning in 2016.

On August 4 and December 16, 2015, the Company held informal discussions about the proposed program with OPUC staff, Oregon Department of Energy, Northwest Energy Coalition, and Citizens' Utility Board of Oregon.

On March 4, 2016, the Company filed Advice No. 16-04 requesting authorization to implement a pilot irrigation load control program for irrigation customers near the Oregon and California border, specifically in the Klamath Basin area. The pilot was intended to test program design and interest among irrigation customers in the region. The filing included the following pilot program attributes:

- A five year pilot program to allow sufficient time for participants to work through scheduling and water availability issues and to investigate changes to pumping operations.
- A minimum of four dispatch events per season allowing growers to experience and adjust to operational impacts. [2]
- A year-end report that provides information on program participation, program costs, load control achieved and other benefits, provided within 90 days of the end of each calendar year prior to the end of the five year pilot.

On May 3, 2016, the OPUC approved Advice No. 16-04.

2016 Timeline

May 3	Oregon Public Utility Commission approves Advice 16-04
May 26	Initial recruitment starts at small basin workshop in Klamath Falls
June/July	Recruitment continues, initial agreements signed, equipment installations occur
August 17	Equipment/communication tests completed. Program goes "live" with initial participants.
August 18	Event notification to participating customers for August 19 event
August 19	Two hour event conducted between 5pm-7pm, Pacific time
August 19	End of regular season (mandatory events)
September 30	End of season (including voluntary event window). Season end communication to participating customers
Mid-November	Incentives paid to participating customers

[2] Four dispatch events was based on full season availability, not partial year availability such as 2016.

Anticipated Pilot Size

The Company's 2015 IRP helped inform the 3 MW size of the pilot. Year 1 availability (2016) was estimated as a 0-2 MW range due to the uncertainty surrounding the timing of pilot program approval, initial response from customers and other factors.

Anticipated Duration

PacifiCorp proposed a five-year pilot period to provide sufficient time to test a variety of parameters and align with grower input favoring a multi-year program.

Program Parameters /Design

Participation in the Pilot Program requires irrigators to allow their pumps to be interrupted under conditions specified in Schedule 105 and summarized in Table 1.

Table 1. Irrigation Load Control Pilot Program Parameters

Program Parameters	**Description**
Eligible Customers	Irrigation Customers on Schedules 41 or 48 in and around Klamath Falls.
Program Period	Week including June 1 through week including August 15[3].
Program Hours	Weekdays, 12 p.m. to 8 p.m. Pacific Time.
Dispatch Limitations	52 hours per year, 20 events per year, up to 4 hours per event or twelve hours per week.
Incentive Rate	Estimated at $23-$27/kw per year. The program vendor may adjust the incentive rate based upon the needs of the program.
Opt-Outs	Participants may opt out of dispatches. Opting out will lower participation payments proportionally.
Incentive Payments	The incentive payment is calculated at the end of the irrigation season and paid to each participant in the Fall. Participant incentives will be determined by multiplying the average load (kW) a customer can reliably shut-off during program hours by the incentive rate, adjusted for event participation (opt-outs).

Additional information about 2016 customers, dispatch events, incentive rates and payments, and opt out is provided in Appendix 1.

[3] In addition, voluntary events may be dispatched separately through September 30.

2016 Performance

Availability

Program availability in 2016 aligned with initial estimates for Year 1 (Table 2). One two-hour event was called on August 19, 2016. It was determined that 281 kW were available for the event and there was 100% participation. Load control equipment performed as expected.

Table 2. Oregon Irrigation Load Control Pilot – 2016 Performance

	Year 1 (2016)	Year 2	Year 3	Year 4	Year 5
Estimated kW	0 - 2,000	3,000	3,000	3,000	3,000
Proxy kW	565				
kW (event)	281				

*kW values are at customer site

For the 2016 program season only, average available load was set at customer's peak demand from June 2015 as a proxy for available load given the event occurred at the end of the season and a lack of 5-minute interval load data until customers were enabled with site specific hardware.

Program Costs

Program costs in 2016 aligned with initial estimates. Initial estimates of pilot program costs and 2016 actuals provided in Table 3 include vendor costs, customer incentives and customer engagement expenses.

Table 3. Irrigation Load Control Pilot – 2016 Costs

	Year 1 (2016)	Year 2	Year 3	Year 4	Year 5
Estimated Program Costs (Calendar Year)	$150,000	$225,000	$225,000	$225,000	$225,000
Actual Program Costs	$150,000				

Key Challenges and Next Steps

For the Pilot Program delivery, the Company utilized a $/MW available by week payment structure, except the first year. Fixed pricing was utilized in 2016 to better align with initial pilot activities (i.e., customer recruitment, site enablement) and to recognize that MW availability would not be available every week of initial season.

At the end of 2016, the existing vendor reviewed the 2016 economics for future years of the pilot program in Oregon and identified a gap between revenue and direct costs associated with delivering the small-scale pilot in 2017 and beyond. Analysis of revenues and costs does not indicate a sustainable path for the Oregon Pilot Program under the existing pricing structure.

To maintain continuity of the Oregon customer offer and to provide Pacific Power the time required to seek alternate pricing, the Company plans to continue with the fixed price model for 2017. During the 2017 season, the Company will issue a Request for Proposals (RFP) for the pilot (including expansion of the pilot and potentially other Pacific Power demand response products) [4]. Following the 2017 season, the company will reassess the size and sustainability of the pilot and make a determination for the future. During the 2017 season, no new customers will be added to the program with the exception of a customer with two medium voltage sites enrolled, but not enabled in 2016. This will increase the available MW for 2017 and incorporate a new type of customer into the pilot program. All enabled customers are anticipated to be available for the entire 2017 season, beginning June 1 and the Company will dispatch the system the minimum of four times.

[4] A potential filing to expand the irrigation load control pilot program into California will remain on hold and be reassessed with revised delivery and pricing options.

Appendix 1
2016 EnerNOC Pacific Power Irrigation Load Control Program Report

As part of their delivery contract with the Company for the pilot program in Oregon, EnerNOC prepares an annual report on program activities including total program enrollment, sites added, customer outreach, crops, weather data, any available information on water restrictions, incentive payments, load control events, and key observations. Their report is provided as Appendix 1 to this report.

2016 Pacific Power Irrigation Load Control Program Report

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Date:
March 17, 2017

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Overview of the 2016 Irrigation Load Control Program

This report provides an overview of the Irrigation Load Control (ILC) program in the Klamath Falls, Oregon region of the Pacific Power service territory as implemented and administered by EnerNOC. This report is intended to document program results, accomplishments, and challenges, including lessons learned.

Regulatory approval for the ILC program in Oregon was granted by the Public Utility Commission of Oregon on May 3, 2016. Customer recruitment for the ILC program began in earnest following regulatory approval. However, given the tight timeline between regulatory approval and the start of the program season (week including June 1st), customer recruitment and enablement was not completed until nearly two months into the program season at the end of July. One load control event was conducted on the last day of the 2016 program season (August 19th).

The ILC program was available in 2016 to irrigation loads in the Klamath Falls, Oregon region of the Pacific Power service territory for customers that were not already participating in the time of use program. A total of 7 sites enrolled in the program in 2016, providing a total of 657 potential capacity (peak) kW in 2016. However, 2 sites were not enabled as described below and the potential peak capacity in 2016 was 565 kW. Participating sites were compensated for shutting off irrigation load for specific time periods determined by Pacific Power, and were provided day-ahead notice of load control events. Customers had the opportunity to opt-out of (i.e., choose not to have their pumps curtailed) for events as necessary to suit their day-to-day business operations.

Customer incentives in the ILC program are based on the site level average available load during load control program hours adjusted for the number of opt outs or non-participation. The program hours are 12pm to 8pm Pacific Time (PT), Monday through Friday, and do not include holidays. For the 2016 program season only, average available load was set at customer's peak demand from June 2015 as a proxy for available load given a late start to the program season and a lack of 5-minute interval load data throughout the first two months of the program season until customers were enabled with EnerNOC hardware.

Pacific Power initiated one load control event on August 19th delivering 281kW in actual load reduction. This load reduction is calculated according to 5-minute interval data from EnerNOC's energy monitoring equipment. The performance factor was 100%, which indicates that all 5 sites participated in the event with no opt-outs.

Review of 2016 Enrollment and Enablement

Customer Outreach

EnerNOC's 2016 enrollment efforts began in May 2016 immediately following regulatory approval for the program in Oregon from the state commission. EnerNOC participated in an energy management event hosted by Pacific Power in Klamath Falls, Oregon on May 26th in which EnerNOC solicited a small number of prospective customers for participation in the ILC program. Several prospective customers indicated their interest in the program at the event. Nearly all of the interested and eligible prospects enrolled and participated in the 2016 program

season following additional conversations with EnerNOC sales after the event. Several prospective customers were already participating in the time of use program, which excluded them from participating in the ILC program. The primary driver for customer participation in the program is the annual incentive payment, which EnerNOC sales estimates and highlights for customers during the sales process based on pump horsepower and typical run time.

Customer Payment Structure

EnerNOC and Pacific Power proposed a $23-$27/kW incentive range for the program. All participants during a year will be paid the same incentive on a $/kW basis with kW based on measured performance. In 2016, participants were paid at the $23/kW rate. This payment structure is designed to provide fair and consistent treatment for sites of similar size and operation.

Enrolled Customers

A total of 5 sites (three customers) were enrolled in the 2016 ILC program in Oregon. Two additional sites contracted with EnerNOC to participate, but were unable to, due to EnerNOC's inability to enable the sites given the complexity of the customer's pumping equipment. In order to enable and monitor these sites, Pacific Power will need to install interval meters and pulses, which EnerNOC can monitor through a meter pulse. These metering upgrades were not able to be completed in time for the customer's participation in the 2016 program season.

Data Quality

EnerNOC's Data Operations team validates all 5-minute interval data following Irrigation Load Control events and for the entire program period each year. Data quality tools developed by EnerNOC in recent years were used in 2016 to verify pump runtime. Wireless connectivity and on-site hardware issues can cause data stream gaps or poor quality data, and power is often cut to irrigation pumps when they are not in use, which can obfuscate the distinction between a powered-down device and a hardware problem. To improve verifications of power status, EnerNOC uses an M2 Power Log tool to transmit and record "last gasp" power messages from the M2 devices to the EnerNOC platform. The log messages indicate the last recorded status of the M2 as powered-on or powered-off. In this manner, EnerNOC has a list of devices that were deliberately powered down for the purpose of event participation and can differentiate from those devices with bad metering or communications problems. Pacific Power and EnerNOC have agreed that where the powered off status is confirmed by this tool for an event, event participation will be credited.

In 2016, EnerNOC did not identify any pumps with data stream gaps or persistent data quality issues during program hours. New hardware, recent enablement and only several weeks of the 2016 program season remaining by the time all of the sites were enabled likely led to the lack of data quality issues.

Review of 2016 Program Participants and Performance

Customer Crop/Operations and Pumping Equipment

Customer crop types/operations included alfalfa, wheat, and hay. Pump sizes ranged from 60 hp to 250 hp.

Impact of Crop Type

Experience in other programs shows that crop type can typically be a predictor of customer willingness and ability to successfully participate in the Irrigation Load Control program. Irrigators in Klamath Falls most commonly grow alfalfa, wheat, hay, corn and potatoes, or some combination thereof over the course of a multi-year planting schedule.

- **Alfalfa** is typically grown on a five to seven year planting cycle and is watered consistently across the season. Prices have been particularly high since 2013, and many irrigators are choosing to plant this crop. Typically alfalfa crops have the flexibility to participate in events due to a tolerance for shifts in watering schedules. However, the load profile of alfalfa is intermittent. Pumps watering alfalfa are typically shut off for two periods each summer for harvest. These harvest periods can last a week or more, resulting in significantly reduced availability.
- **Wheat** will typically require large amounts of water early in the program season, and then pumps will be shut off once for several weeks to allow the crop to dry out for harvesting. These are tolerant crops that can withstand a couple off-schedule days to participate in load control events. However, incentive payments will be affected by variable availability.
- **Potatoes** are a water-intensive crop that typically stays in the ground for one to three years, and is often rotated with wheat. Potatoes are significantly more sensitive to irrigation schedule interruptions than wheat or alfalfa. Irrigation Load Control participants with potato crops will have high availability but likely a reduced flexibility to participate in load control events. Potatoes will also be particularly sensitive in drought years, further impacting event participation.
- **Corn** and **fields watered for livestock pasture** have less consistent or predictable irrigation schedules, and are mostly found on dairy farms.

A pump that waters wheat in year one with high event participation and 50% availability due to harvesting downtimes may water potatoes in year two. This crop shift would likely result in a shift to lower participation but 95% availability, making it difficult to use single year performance as a predictor.

Impact of Irrigation Technology and Water Availability

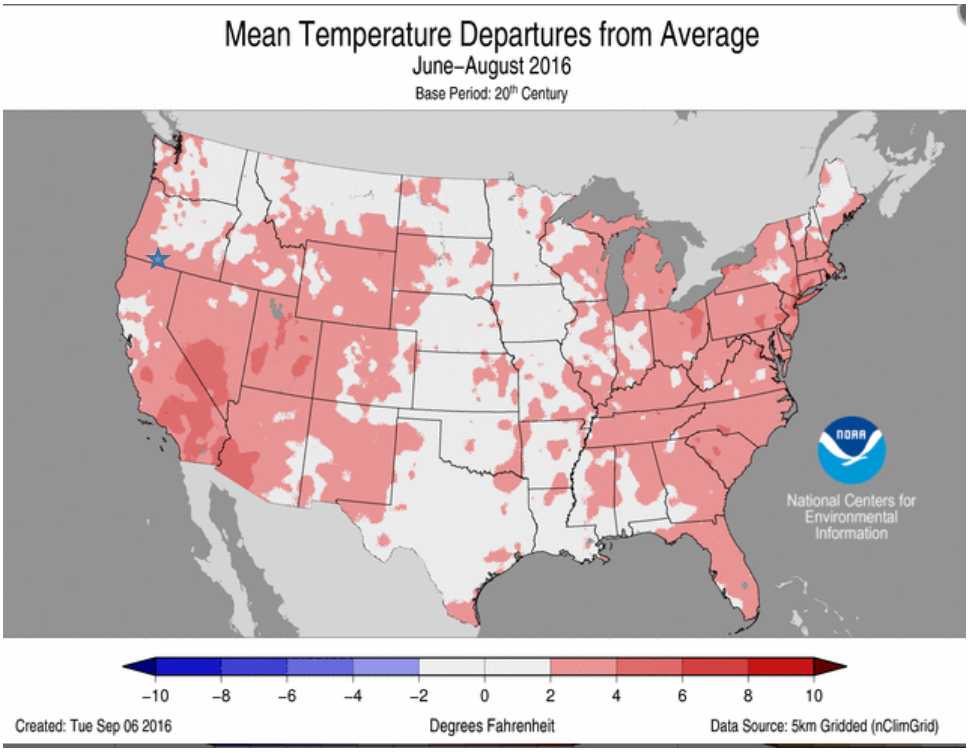
While pump size is a clear determinant of total availability in the ILC program, irrigation technology and water availability also impact irrigation pump run-time and thus can affect customer success in the ILC program. Pivot irrigation systems are operationally easier to manage for load control events than a wheel line or hand line irrigation system.

During the 2016 enrollment and enablement process, participants did not raise issues or questions about current or potential future water restrictions impacting their ability to participate in the program. EnerNOC does inquire with customers about water restrictions in the enrollment and enablement process, but does not restrict customer participation based on any water usage restrictions on participants other than to mention that reduced pumping may reduce incentives if participants are pumping less throughout the program season and/or if restrictions require them to opt-out of load control events due to use-it or lose-it water availability, for example.

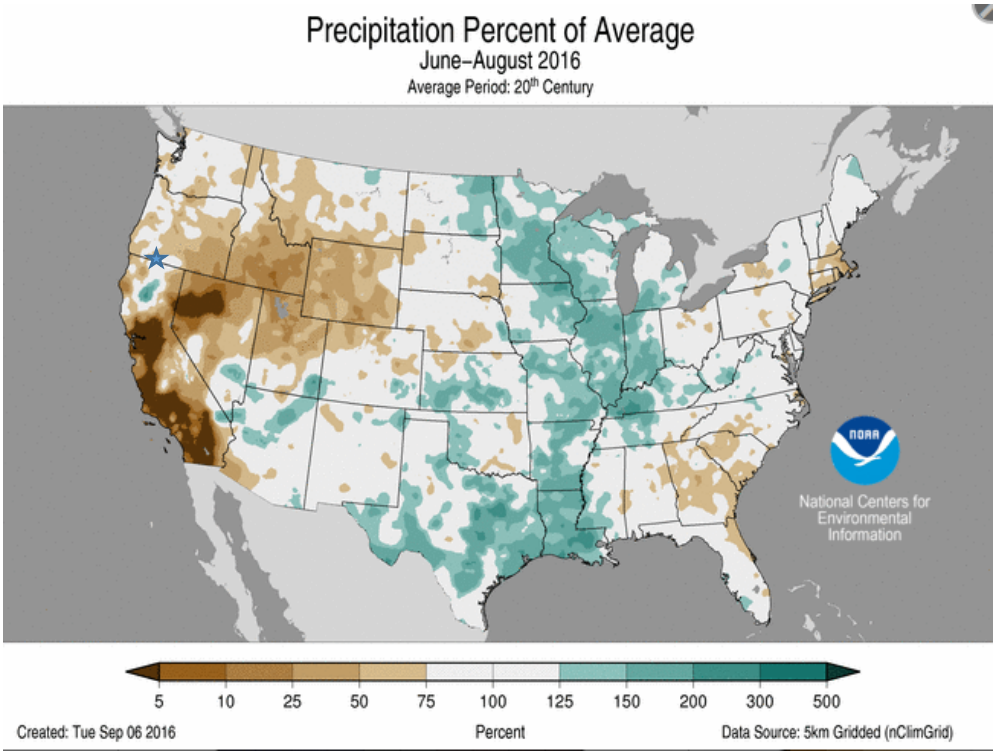
Weather and Drought Impact

2016 was warmer and dryer than normal, especially in July and August.[5] Warmer and dryer conditions, likely led to greater irrigation needs and higher available loads versus historical averages. However, given that this is the first program season and there is a lack of historical interval data for comparison, higher average load assumptions during the program period cannot be verified.

The two images below highlight the above average temperatures and below average precipitation across much of the western part of the country including the ILC program region during the 2016 program season.



[5] Source: NOAA Mean Temperature Departures from Average (June-August) and Precipitation Percent of Average (June-August), available online: https://www.ncdc.noaa.gov/sotc/national/201608.



Weekly Available Load Reduction

The Pacific Power ILC program is evaluated based upon average available load reduction (kW) between the nearest Monday on or before June 1st and the nearest Friday on or after August 15th during program hours from 12 to 8pm Pacific Time, non-holidays. In 2016, the program was active between Tuesday, May 31st and Friday, August 19th, however, enrollment, contracting and equipment installation took most of the season with equipment/communication tests complete on August 17th. The portfolio-average available load reduction was 565 kW using a proxy for weekly available load of June 2015 site level peak demand since start-up and equipment installation took much of the 2016 season.

The image below shows daily demand from august 2016 when the first pumps were enabled through early October and the end of the irrigation season. Peak daily demand of just over 400kW was set on August 29th. Customers stopped their irrigation activities in line with the end of the growing season in late September with load dropping to 0kW on Sept 30th and remaining at ~0kW for the remainder of the year. The shape of the seasonal load curve is in keeping with expectations that the highest load should align with the active growing season and the warmest seasonal periods. Without data in June and July, conclusions about whether the August 29th demand level was truly the seasonal peak cannot be verified.

Load Control Events

Pacific Power activated the ILC program for one control event in 2016. Actual load reduction was measured as the difference between actual demand during the event and baseline demand. Baseline demand was the average demand during program hours (12 to 8pm PT) on the most recent non-event, program day (August 18th). Actual Load Reduction (kW), Baseline Demand (kW) and Load Reduction Performance Factor as reported here correspond to 5-minute interval energy usage measurements from EnerNOC's equipment at customers' sites. These measurements may not correspond to realized load reduction on Pacific Power's system.

The 2016 portfolio delivered 281kW in the single load control event called during the 2016 program season. Load Reduction Performance Factor, the measure of actual load reduction compared to baseline demand, was 100% for the portfolio. A customer participation factor is also calculated for each participating site and is designed to measure customers' choices to opt-out of participating in events. This customer participation factor is used to adjust availability payments because of the pay-for-performance nature of the program. Performance factor should not be confused with any notion of performance against a capacity nomination. In the 2016 program season, load reduction performance factor and customer performance factor were both 100%.

The image below is a visual representation of the August 19th load control event showing the 5-minute interval demand relative to the baseline.

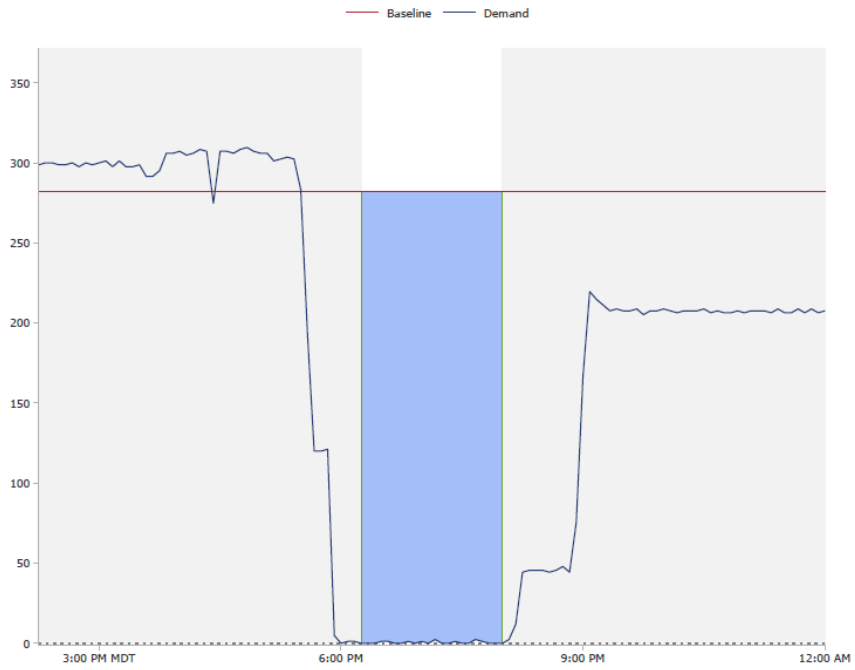


Figure 2 below provides details of the mandatory event in 2016 including the actual load reduction, baseline demand and performance factor. No events were called and then subsequently cancelled in 2016. Additionally, there were no voluntary events in 2016.

Figure 2: Actual Load Reduction, Baseline Demand, and Performance Factor, by Event and Region

Date	Region	Actual Load Reduction (kW)*	Baseline Demand (kW)*	Load Reduction Performance Factor (%)*
8/19/ 2016	Oregon	281	282	100%
Summer	Oregon	281	282	**100%**

*Actual Load Reduction (kW), Baseline Demand (kW) and Load Reduction Performance Factor as reported here correspond to 5-minute interval energy usage measurements from EnerNOC's equipment at customers' sites. These measurements may not correspond to realized load reduction on Pacific Power's system.

Figure 3: List of 2016 Event Activity

Type	Start Time (PT)	End Time (PT)	Notes
Mandatory Event	8/19/2016 18:00	8/19/2016 20:00	• Total baseline demand was 282kW • Total load reduction was 281MW • Performance factor was 100% • Despite a small number of sites participating in the 2016 program season, 100% participation factor is excellent as all customers participated and none opted-out

Key Lessons Learned from 2016

There were 2 key lessons learned in 2016.

1. There were three months between receiving regulatory approval for the ILC program in Oregon and having resources available for dispatch. The pace of program implementation and site enablement highlights one of the key benefits of demand response;

2. In more remote regions in which EnerNOC operates, the company often finds that limited cellular reception can present challenges in data quality and completeness of data communication. With a range of customer sites across the Klamath Falls area without a single communication issue, our experience suggests that cellular communication issues will not be material issue as it has been in remote parts of other states.

APPENDIX A: Customer-Facing Irrigation Load Control Activity

The table below lists all activity involving program participants related to the Irrigation Load Control program that occurred in 2016, excluding Irrigation Load Control events. See figures 2 and 3 above for dates and detail related to those events.

Figure 4: Participant-Facing Irrigation Load Control Activity in 2016

	Activity	Date	Description
1	**ILC Participants Enrolled**	May - June 2016	New program participants signed contracts with EnerNOC to enroll for 2016 program season.
2	**Enrollment Communication and Notification Test**	Wednesday, 8/17/16	EnerNOC's Network Operations Center sent test notification messages via phone call, text, and/or email to all enrolled contacts in advance of the program going live on August 17th. Customers were asked to confirm receipt or call EnerNOC with contact changes.
3	**Season End Communication**	Friday, 9/30/16	EnerNOC's Network Operations Center sent reminders via text message to all enrolled contacts that Irrigation Load Control had ended for 2016 (mandatory & voluntary periods).
4	**Incentives Mailed to Participants**	Weeks of 11/14/16	EnerNOC mailed incentive checks to participants in in the middle of November.

APPENDIX B: Customer Payments

Three customers received incentive payments for their participation in the 2016 ILC program season.

For the 2016 program season only, average available load was set at customer's peak demand from June 2015 as a proxy for available load given a late start to the program season and a lack of 5-minute interval load data throughout the first two months of the program season until customers were enabled with EnerNOC hardware. The proxy kW utilized in calculating payments for 2016 was 565 kW. All customers were paid at the $23/kW rate.

Appendix 2
Initial Oregon Pilot Program Year - Benefits and Costs Discussion

The Oregon pilot program is intended to test designs, provide market feedback, and generate information about delivery logistics and costs. Pacific Power will monitor the costs and benefits to understand the feasibility of expanding the load control program beyond the pilot stage in Oregon. As 2016 primarily involved program startup and one event, it was not an indicative year.

Despite the limited nature of the first pilot year, this Appendix provides discussion of the 2016 program developed in response to Recommendation No. 3 in the April 26, 2016, OPUC staff memo in Advice No. 16-04 to utilize the California Public Utilities Commission Distributed Energy Resource Avoided Cost Framework ("Framework") as a guide when conducting the post season assessment.

Appendix A of the Framework, 2015 Demand Response Cost Effectiveness Protocols (Protocols) is dated November 2015[6]. It is important to note that these protocols are not directly applicable to pilots: "These protocols are not designed to measure 'pilot' programs, which are done for experimental or research purposes, technical assistance, educational or marketing and outreach activities which promote DR or other energy-saving activities in general...[7]" Although these Protocols are not directly applicable to pilots, they are being used here as an initial guide to help discuss the pilot program as it moves forward.

To utilize the Protocols as a guide, information from pages 11 and 12 of Appendix A is provided below, italicized; Protocol references to California utilities have been removed. 2016 program information is provided below each Protocol topic and labeled "Pilot" for the purposes of this discussion.

1. *Avoided Generation Capacity Costs*
   Pilot: This resource was too small to avoid any generation capacity additions.

2. *Avoided Energy Costs*
   Pilot: Avoided energy during the two hour event was too small for the Company to assess any possible arbitrage value. Initial indications were that most of the load was restored after the event, however, absent a full season of data for these sites, it is not possible to definitively conclude that the loads were either shifted or shed. For 2017, when full season data is available, the Company will perform further analysis to see if event loads are shifted or shed.

3. *Avoided Transmission and Distribution Costs*
   Pilot: Avoided transmission and distribution costs and their applicability to load management resources are consistent with work completed for the 2015 IRP.[8] Assigning a transmission deferral value to load management is consistent with the 2017 IRP and the Northwest Power Planning and Conservation Council's 7th Power Plan. The 2017 IRP will provide an update

[6] *2015 Demand Response Cost Effectiveness Protocols*, California Public Utilities Commission, 2015.
[7] *Id*. page 7.
[8] 2015 IRP, Volume 1, page 124.

(relative to the 2015 IRP) for transmission deferral and apply that value to new potential demand response resources.

4. *Avoided Environmental Costs for Greenhouse Gases (GHG)*
   Pilot: There are no published costs for GHG that are applicable to this analysis. There are no Oregon explicit avoided environmental cost associated with GHG reductions.

5. *Line Losses*
   Pilot: Line losses for irrigation customers in Oregon are 9.892% and are derived from the 2009 Management Application Consulting line loss study.

6. *Weighted Average Cost of Capital (WACC)*
   Pilot: Not applicable for contemporaneous recovery of these pilot costs.

The LSE will specify the following quantitative information relevant to the evaluation of each program, following the procedures outlined in these protocols:

1. *Load Impacts, in MW*
   Pilot: For the one event, August 19, 2016, hours 1700-1900, the baseline demand (the average of the hours 1200-2000 for the prior day) was 282 kW. During the event, the measured load reduction was 281 kW at site. Applying the 9.892% line loss, the load impacts at the generator are 309 kW.

2. *Expected Call Hours of the Program (used to determine energy savings)*
   Pilot: Program was called for 2 hours in 2016. This is approximately 4% of 52 maximum annual dispatch hours. The percentage was low in the initial year since the resource was only available in the last week of the Dispatch period.

3. *Administrative Costs*
   Pilot: Administrative (non-incentive) costs paid in 2016 to EnerNOC included fixed startup costs for the pilot and costs will be reassessed as part of a 2017 RFP process.

4. *Participant Costs (for only those programs which are not using a percentage of incentives as a proxy measurement)*
   Pilot: Participants do not incur capital costs to participate.

5. *Capital Costs and Amortization Period, both to the LSE and to the Participant (should be specified for each investment)*
   Pilot: There are no unamortized capital costs to recover over an amortization period. 2016 program expenses were paid in November 2016, and are being recovered contemporaneously through Schedule 95.

6. *Revenues from participation in CAISO Markets (such as ancillary services or proxy demand resource)*
   - *CAISO Markets Entered*

- *Average megawatts (MWs) and hours bid into those*
- *Average market price received*
  Pilot: This resource was not large enough to change any portion of the Company's participation in CAISO markets.

7. *Bill Reductions and Increases*
   Pilot: 2016 participant's bills were not analyzed for changes given the small chance a single two hour event would have had an impact.

8. *Incentives Paid*
   Pilot: 2016 incentive payments were $12,995 (565 kW * $23/kW-yr)

9. *Increased Supply Costs*
   Pilot: The resource is too small to change supply costs.

10. *Revenue Gain/Loss from Changes in Sales (usually assumed to be the same as bill reductions and increases)*
    Pilot: See No. 7 above.

11. *Adjustment Factors (if not required to use default values).*

- *Data Need to Calculate Availability (A Factor)*
  Pilot: The portion of the capacity value that can be captured by the program based on availability (daily, monthly), frequency, and duration of calls permitted. While this program is likely to be coincident with generation capacity constraints in the summer, it is not necessarily available during all hours (weekends, before June 1st) that a generation constraint could occur.

- *Notification Time (B Factor)*
  Pilot: This program has day ahead notification.

- *Trigger (C Factor)*
  Pilot: Events can be called at the discretion of utility (within the specified months, weeks, days, hours). Other than that, there are no restrictions. In addition to the testing value, the August 19th event was triggered by a forecast for higher than typical power prices for the super peak period. In addition, hot weather was forecast for the period.

- *Distribution (D Factor)*
  Pilot: The D factor can be summarized as "right time", "right place", "right certainty", and "right reliability". The pilot was not designed to avoid specific local investments.

- *Energy Price (E Factor)*
  Pilot: The energy during the single 2016 event was too small for the Company to assess possible arbitrage value.

- *Flexibility (F Factor)*
  Pilot: The pilot is too small for the Company to assess possible F Factor value.

- *Geographical/Local Avoided Generation Capacity (G Factor)*
  Pilot: Not applicable.

The LSE may also add the following optional inputs:

1. *Social non-energy benefits, such as environmental benefits (in addition to the avoided GHG cost included in the avoided cost calculator), job creation benefits, and health benefits.*
   Pilot: Not applicable.

2. *Utility non-energy benefits, such as fewer customer calls and improved customer relations.*
   Pilot: Not applicable.

3. *Participant non-energy benefits, such as improved ability to manage energy use and "feeling green."*
   Pilot: Not applicable

4. *Market benefits, such as market power mitigation and market transformation benefits*
   Pilot: Not applicable.